

Patent Claims

1. A device for regulating the temperature of sections (Zone 1, Zone 2, ... Zone n) of the interior of an aircraft with

5 - a controlled mixer valve (MV) for the mixing of engine bleed air with air cooler than the engine bleed air in order to obtain pre-tempered mixed air (ML) flowing out of the mixer valve (MV);

- a distribution line (DL) connected to the outlet of the mixer valve (MV) which is connected with the respective sections (Zone 1, Zone 2, ... Zone n) by means of at least two supply lines (L1, L2, ... Ln);

10 - individual heating units (H1, H2, ... Hn) assigned to the respective sections (Zone 1, Zone 2, ... Zone n);

- sensors (S1, S2, ... Sn) assigned to the individual sections (Zone 1, Zone 2, ... Zone n) for the respective actual temperatures (Tactual-Zone 1, Tactual-Zone 2, ... Tactual-Zone n) and transmitters (G1, G2, ... Gn) for the respective nominal temperatures (Tnominal-Zone 1, Tnominal-Zone 2, ... Tnominal-Zone n);

15 - a regulator unit (ECU) which

-- controls the mixer valve (MV) dependent upon the respective nominal temperatures (Tnominal-Zone 1, Tnominal-Zone 2, ... Tnominal-Zone n) and the respective actual temperatures (Tactual-Zone 1, Tactual-Zone 2, ... Tactual-Zone n) of the individual sections (Zone 1, Zone 2, ... Zone n) in such a way that

20 --- the pre-tempered mixed air (ML) is of a temperature which essentially corresponds to the lowest of the nominal temperatures (Tnominal-Zone 1, Tnominal-Zone 2, ... Tnominal-Zone n) of all sections (Zone 1, Zone 2, ... Zone n),

25 and

-- controls the heating units (H1, H2, ... Hn) assigned to the other sections (Tnominal-Zone 1, Tnominal-Zone 2, ... Tnominal-Zone n) corresponding to the differences between the respective nominal temperatures (Tnominal-Zone 1, Tnominal-Zone 2, ... Tnominal-Zone n) and the respective actual temperatures (Tactual-Zone 1, Tactual-Zone 2, ... Tactual-Zone n).

30 2. Device in accordance with claim 1,

characterised in that the heating units (H1, H2, ... Hn) in the supply lines (L1, L2, ... Ln) are preferably positioned close to entrances to the respective sections (Tnominal-Zone 1, Tnominal-Zone 2, ... Tnominal-Zone n).

35 3. Device in accordance with claim 1 or 2,

characterised in that the heating units (H_1, H_2, \dots, H_n) are made from electric heating elements.

4. Device in accordance with any of the claims 1 to 3,
characterised in that the sensors (S_1, S_2, \dots, S_n) for the respective actual temperatures (Tactual-Zone 1, Tactual-Zone 2, ... Tactual Zone n) are positioned in the individual sections (Zone 1, Zone 2, ... Zone n) and/or in the supply lines (L_1, L_2, \dots, L_n) down current from the heating units (H_1, H_2, \dots, H_n).

5 10 5. Device in accordance with any of the claims 1 to 4,
characterised in that the air which is cooler than the engine bleed air and which is supplied to the mixer valve (MV) comes out of a mixing chamber (MK).

15 6. Device in accordance with any of the claims 1 to 5,
characterised in that the regulator unit (ECU) takes into consideration the nominal temperatures ($T_{nominal-Zone 1}, T_{nominal-Zone 2}, \dots, T_{nominal-Zone n}$), the actual temperatures (Tactual-Zone 1, Tactual-Zone 2, ... Tactual-Zone n) and the characteristics of the respective sections (Zone 1, Zone 2, ... Zone n) for the control of the heating units (H_1, H_2, \dots, H_n)

20 7. Device in accordance with any of the claims 1 to 6
characterised in that the transmitters (G_1, G_2, \dots, G_n), the sensors (S_1, S_2, \dots, S_n) and/or the heating units (H_1, H_2, \dots, H_n) are coupled to the regulator unit (ECU) by means of one or several data buses.

25 8. Device in accordance with any of the claims 1 to 7,
characterised in that the regulator unit (ECU) has at least one central section temperature regulator and a decentralised heat regulator for each heating unit (H_1, H_2, \dots, H_n).

30 9. Process for regulating the temperature of sections of the interior of an aircraft with the following steps:
- recording of the respective actual temperatures and the respective nominal temperatures in the individual sections;
- mixing of engine bleed air and air which is cooler than the engine bleed air in order to obtain pre-tempered mixed air at a temperature which essentially corresponds to the lowest of the nominal temperatures recorded;
- distribution of the pre-tempered mixed air to all sections; and

- post-tempering of the mixed air distributed to the sections with higher nominal temperature corresponding to the differences between the respective nominal temperatures and the respective actual temperatures.

5 10. Process in accordance with claim 9 which takes into consideration the nominal temperatures, the actual temperatures and respective section characteristics for post-tempering.

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